

polype where the medusæ are to bud forth, we find the endodermic wall occupied by large refringent cells; these are the primitive mother cells. Soon the endoderm and the ectoderm form a cæcal diverticulum, into which the mother cells pass. This diverticulum will become a medusa; and the mother cells will occupy its endoderm; the intermediate lamella passes over them.

I will not enter into the details of the development of the medusa, as I shall soon have the honour of laying before the Academy a memoir upon this subject. It will suffice to say that after this period the testicular mass grows rapidly, that the endoderm is reconstituted in the form of a new uninterrupted layer beneath this testicular mass, and that the mass of spermatozoids finally occupies the manubrium of the medusa between the ectoderm, which has become considerably thinner, and the newly-formed layer of endoderm already mentioned.

To sum up, in these three species

1. The male sexual products do not originate in the gonophores, medusoid buds, or medusæ, as has been supposed, but in the *cœnosarc* of the hydroid polype itself, as I have already shown to be the case with the ovum.

2. The primitive mother cells of the spermatozoids are derived, like the ova, from differentiated endodermic cells.

3. Like the ova again, these mother cells pass into a diverticulum of the walls of the body; and this diverticulum by development becomes a gonophore, destined to be always attached to the hydroid polype, or a semimedusa, or a free medusa.

4. The origin of the sexual products and their development therefore present a very great analogy in the male and female colonies.

5. If we accept these facts as demonstrated, the gonophores, the semimedusæ, and the medusæ in both the male and female colonies can be regarded only as representing the sexual individuals; and it consequently appears that alternation of generations cannot be accepted.—*Comptes Rendus*, December 12, 1881, p. 1032.

On the Phenomena of Division in Euglypha alveolata and the Monothalamous Rhizopods in general. By Dr. AUG. GRUBER.

The investigations of Dr. Gruber upon the phenomena of the multiplication by division in *Euglypha alveolata* and other Monothalamous Rhizopods reveal important facts in the history of these creatures. They show especially how the envelopes of the body being more or less supple or resistant, influence the mode in which division is effected.

If we group the Monothalamia in accordance with the nature of their covering, we may form a first category for those of which the carapace consists of little plates of various forms produced by the sarcode of the animal itself. It is here that we must place the species upon which the author has made the most complete investigations.

Leidy observed two examples of *Euglypha alveolata* united by their soft parts in the oral region—that is to say, at the orifice of the shell. One of these individuals was at first much smaller than the other; but at the end of an hour it had attained the normal dimensions, and currents of protoplasm passed from one individual to the other. This fact alone seemed to indicate that this was a phenomenon of division rather than of conjugation. But the observation was too imperfect to permit any certain conclusions to be drawn from it. Dr. Gruber has completely elucidated the mode of reproduction in question, by following step by step all its phases in the same individual.

In a well-developed specimen of *Euglypha alveolata* we observe in the region where the nucleus is situated some small very refractive bodies, which preceding observers have regarded as being the little plates destined to form the new carapace after a moult. This interpretation, which is correct so far as the nature of the bodies is concerned, is not so with regard to the part they have to play.

According to Dr. Gruber's observations a certain quantity of protoplasm projects from the carapace through the aperture of the latter. At the same time the little plates just mentioned set themselves in motion, and arrange themselves one behind the other along the wall of the carapace. From this a series is soon seen to issue and arrange themselves round the process of protoplasm that has been expelled through the aperture. The quantity of this protoplasm gradually increases; and at the same time fresh platelets issuing from the parent individual become imbricated upon its surface. In from half an hour to an hour these pieces, about eighty in number, have taken their places, and the new creature has acquired the aspect of a fir-cone; finally, a little later, they present their definitive arrangement, and the *Euglypha* that they protect only differs from that which has given it birth by the absence of a nucleus.

While the carapace is forming, the maternal nucleus undergoes certain changes. Fine granulations or curved lines make their appearance in it. It soon presents movements, slowly changes its form, and finally becomes elongated in the direction of the major axis of the animal. It then shows a longitudinal striation, which grows more and more distinct; and at the same time its length comes nearly to equal that of the animal. Then it becomes constricted and divides into two halves, one of which remains in the original individual, while the other passes into the newly-formed one. After passing away from the point of union of the two *Euglyphæ*, these nuclei lose their striation and are distinguishable only in the form of more transparent spaces.

In the protoplasm a movement of circulation then commences, and takes place both in the interior of each individual and from one individual to the other; this lasts for about a quarter of an hour and then ceases. After some changes of little importance a loosening occurs at the point of union of the two *Euglyphæ*; pseudopodia make their appearance there; and finally the two creatures separate and are equally complete.

The observations of F. E. Schultze on *Quadrula symmetrica*, and those of Leidy on *Trinema acinus*, show that in these two genera the same things evidently take place as in *Euglypha*; that is to say, the platelets protecting the body are produced in the interior of the parent individual, and afterwards conveyed round the body of the daughter individual. M. Gruber has almost completely traced these same phenomena of division in *Cyphoderia ampulla*, the carapace of which is not formed of a comparatively restricted and tolerable constant number of plates, but rather of an infinity of little particles which gives this envelope the aspect of shagreen.

The phenomena of division seem to be nearly the same in the *Arcello*.

In the Monothalamia with carapaces formed of foreign materials, such as the *Diffugia*, which are covered with grains of sand &c., individuals have been observed united by their buccal poles; and this state has been regarded as the result of conjugation. According to Dr. Gruber this interpretation is incorrect, and the individuals thus joined must be the product of a division on the point of completion. With Bütschli he assumes that these Rhizopods first of all introduce into their bodies the foreign substances which are to serve for the formation of the envelope. The sand-grains, Diatoms, &c. are then transported to the outer surface of the newly-formed individual, just in the same way as the platelets of the *Euglypha*, *Quadrula*, &c.

The forms which are protected by an inflexible chitinous carapace also present the same mode of multiplication. This would seem to be proved by Dr. Gruber's observations on *Microgromia socialis*, and Schneider's on *Diffugia inchelys*.

On the other hand, in the genera which have an envelope formed by a flexible membrane adherent to the sarcode of the body, division takes place, as in the *Amœbe*, in the mode that may be denominated normal, because it is that which is by far the most frequent in animal cells. A constriction is produced in the middle of the body, and causes the formation of two individuals.—*Zeitschrift f. wiss. Zool.* xxxv. p. 431, & xxxvi. p. 104 (1881); *Bibl. Univ., Archives des Sciences*, December 15, 1881, p. 624.

The Mediterranean Species of Fierasfer. By Prof. C. EMERY.

Fierasfer acus, the commonest species in the Mediterranean, attains a length of 19 centim. (about $7\frac{1}{2}$ inches), and takes up its abode preferently in the large Holothuriæ, such as *Holothuria tubulosa* and *Stichopus regalis*. The author has frequently observed the process adopted by the little fish for introducing itself into the body of the Echinoderm. It commences by examining the whole length of the latter until it has discovered at which end the anus is situated. It places its muzzle against this orifice, and then, at the